

REMARKS

Applicants respectfully request entry of the amendments to claims 29 and 32, cancellation of claims 30 and 31, and addition of new claim 33 as set forth herein to place the present application in condition for allowance or in better condition for purposes of appeal. No new matter has been added to the application by virtue of the present amendment. Applicants believe the present amendment does not raise new issues requiring further search by the Examiner.

Accordingly, claims 29, 32 and 33 are pending in the subject application. It is respectfully requested that the pending unallowed claims be reconsidered and passed to issuance in view of this response.

Claim Rejections -- 35 U.S.C. 112, first paragraph

The Examiner rejected claims 29, 30 and 32 under 35 U.S.C. 112, first paragraph as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention.

Regarding claim 29, Applicants respectfully request that claim 29 be amended to delete the limitation that the oxidizing agent "consists of a metal-based compound". Claim 32 is dependent upon independent claim 29.

Regarding claim 30, Applicants respectfully request that claim 30 be canceled.

Therefore, Applicants believe that the rejections under 35 U.S.C. 112, first paragraph have been overcome.

Claim Rejections -- 35 U.S.C. 103(a)

The Examiner rejected claims 29-32 under 35 U.S.C. 103(a) as being unpatentable over either Kaufman et al. (U.S. Patent No. 6,217,416 B1) and Kaufman et al. (U.S. Patent No. 6,063,306).

Applicants respectfully request that claim 29 be amended to include the limitations of a first slurry and a second slurry comprising "... a surfactant comprising sodium octyl sulfate ...". Claims 32 and 33 are dependent upon independent claim 29, as amended. Support for Applicants' amendment can be found, for example, on page 8, lines 20-21, as amended. Duponol SP is the tradename for a mixture including sodium octyl sulfate. Applicants have found that the use of sodium octyl sulfate acts as a wetting agent to decrease the surface tension of the slurry resulting in the desired removal rates (page 9, line 28 - page 10, line 8).

Kaufman et al. ('416) and Kaufman et al. ('306) provide no teaching or suggestion of using "... a surfactant comprising sodium octyl sulfate ...". Kaufman et al. '416 and '306 teach using a surfactant for "... CMP slurry stabilization ...". Further, Kaufman et al. '416 and '306 are silent on the use of sodium octyl sulfate as an ingredient in either slurry. As described above, it was Applicants who found that the use of sodium octyl sulfate is a key ingredient of the slurry by acting as a wetting agent in order to provide the desired removal rates. Applicants stabilize the slurry by controlling the pH of the slurry and not by using a surfactant as taught by Kaufman et al. '416 and '306. Both slurries taught by Kaufman et al. '416 and '306 are lacking a wetting agent (i.e. sodium octyl sulfate) as a component of the slurries.

Therefore, Applicants believe that the rejections under 35 U.S.C. 103(a) have been overcome.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "Version with markings to show changes made."

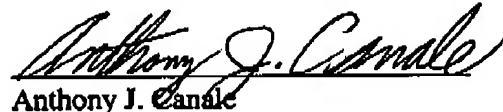
In light of the foregoing amendments and remarks, all of the claims now presented are believed to be in condition for allowance, and Applicants respectfully request that the outstanding rejections be withdrawn and this application be passed to issue at an early date.

The Examiner is urged to call the undersigned at the number listed below if, in the Examiner's opinion, such a phone conference would aid in furthering the prosecution of this application.

Respectfully Submitted,

For: Cote et al.

By:



Anthony J. Canale

Registration No. 51,526

Agent for Applicant

Phone: (802) 769-8782

Fax: (802) 769-8938

Email: acanale@us.ibm.com

IBM Corporation
Intellectual Property Law - Zip 972E
1000 River Street
Essex Junction, Vermont 05452

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VERSION WITH MARKINGS TO SHOW CHANGES MADE**In the Specification:**

Please amend the paragraph beginning on page 8, line 20 as follows:

4) a surfactant, for example, a version of sodium lauryl sulfate, available commercially as one or more of the series of Duponols, such as Duponol SP, a sodium octyl sulfate.

In the claims:

Please cancel claims 30 and 31, without prejudice or disclaimer.

Please amend claims 29 and 32 as follows:

29. (Twice Amended) A method of co-planarizing copper or copper-based metallurgy and a refractory metal-based barrier layer or liner in an interlevel dielectric layer of a semiconductor device comprising the steps of:

planarizing said copper or copper-based metallurgy using a first slurry comprising an oxidizing agent ~~consisting of a metal-based compound~~ comprising ferric nitrate, an oxidation inhibitor, a surfactant comprising sodium octyl sulfate and an abrasive ~~comprising alumina in water~~; said first slurry having a pH of between 1.2 and 2.5 and said first slurry for removing copper selectively with respect to said barrier layer or liner; and

co-planarizing said barrier layer or liner and said interlevel dielectric layer using a second slurry comprising a peroxide agent, an oxidation inhibitor, a surfactant comprising sodium octyl sulfate, and an abrasive comprising silica in water; said second slurry having a pH of between 3.0 and 7.5 and said second slurry for removing said barrier layer or liner ~~at a first removal rate and copper at a second removal rate, wherein the first removal rate is greater than the second removal rate.~~

32. (Once Amended) The method of claim ~~29~~ 33, wherein the first removal rate is about eight times greater than the second removal rate.